Space Weather Forecast

Issued on Monday, 19 December 2022 at 13:25 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Chance of Moderate-class X-ray flares. Slight chance of Minor Geomagnetic Storms.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been Low over the past 24 hours, with occasional mid-ranking moderate flares observed. The largest from a sunspot region near the northwest horizon toward the end of the period. Many of the other similar-magnitude flares originated from the large sunspot region which has been appearing round the northeast horizon. These two were of up to nine sunspot regions on the current Earth-facing disc during the period. However, growth in other regions was generally more limited.

There remain numerous filaments on the disc, although none obviously erupted in the 24 hours. There were numerous Coronal Mass Ejections (CMEs) observed on Lasco coronagraphs in the period, all these are considered to be non-Earth directed but the latest one associated with the latest flare in the northwest is awaiting further analysis for confirmation

Solar Wind / Geomagnetic Activity: Solar winds have remained slow through the period but have gradually increased from 300km/s to 350 km/s. The total magnetic field strengthen was moderate but with extended periods in the negative sector, peaking around 19/0500 UTC. The wind profile suggests the arrival of fast wind stream from a negative source, all be it rather slow. There may also have been some CME effects encompassed within. Resultant geomagnetic activity was mainly Quiet to Unsettled (Kp 0-3), but Active (Kp 4) 19/0300-0600 UTC.

Energetic Particles / Solar Radiation: No solar radiation storms were observed in the period.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is currently Low. There is a chance of increasing to Moderate at times due to isolated Moderate-class flares, and a slight chance of a strong flare. There are currently eight sunspot regions on the disc at present. Successive departures over the western solar horizon through the period may be compensated for by hints of large arriving regions in the east, although this aspect of the forecast is lower confidence, and for now the risk is held constant throughout.

Solar Wind / Geomagnetic Activity: Up to two CMEs from the 15th and 18th December may produce glancing blows at Earth on day 1 (19th) and days 3/4 (21st/22nd) respectively, but are low confidence.

The forecast otherwise comprises of two fast wind streams. The first offers a slight chance of minor geomagnetic storms (G1) on day 1 (19th). After a lull into Tuesday, a second and more reliable fast wind is likely to arrive midweek to give the peak risk of G1 for the four-day period, albeit still a small risk given our proximity to the solstice.

Energetic Particles / Solar Radiation: No solar radiation storms are expected, although there is slight chance with the occurrence of any notable flares

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	10	10	20	5
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	40	40	40	30
Very Active	R3 to R5 X	No	5	5	5	5

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	15	10	10	10
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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